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ABSTRACT

This is the second in a series of three tests of selected micro-teaching and video recording techniques designed to facilitate the identification of alternate ways to increase the effectiveness of vocational teacher education. The tests were conducted to develop feedback techniques in a laboratory under simulated teacher education conditions. This developmental effort further served as a screening device for the most promising techniques prior to seven demonstration and field testing activities which were part of the project, "Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education." With full cognizance of the limitations of the feasibility study, i.e., the size of the sample and the number of simulated teaching sessions, several conclusions were reached. These include: (1) Teachers may improve their performance on pedagogical skills as well under remote and delay-in-feedback techniques as they do under conventional face-to-face conference techniques, (2) The micro-teaching technique may be more beneficial than the particular feedback technique and used with it, and (3) The micro-teaching process was appropriate for testing the feasibility of the feedback techniques in a simulated vocational education program. (Author)

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Assessment of Micro-Teaching and Video Recording in
Vocational and Technical Education: Phase II--

An Analysis of Face-to-Face, Remote and Delay-in-Feedback Techniques

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RESEARCH AND DEVELOPMENT SERIES NO. 54

ASSESSMENT OF MICRO-TEACHING AND VIDEO RECORDING IN
VOCATIONAL AND TECHNICAL TEACHER EDUCATION: PHASE II--

AN ANALYSIS OF FACE-TO-FACE, REMOTE AND
DELAY-IN-FEEDBACK TECHNIQUES

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U.S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE

Office of Education
National Center for
Educational Research
and Development

PREFACE

This is the second in a series of three tests of selected micro-teaching and video recording techniques designed to facilitate the identification of alternate ways to increase the efficacy of vocational teacher education. The tests were conducted to develop feedback techniques in a laboratory under simulated teacher education conditions. This developmental effort further served as a screening device for the most promising techniques prior to seven demonstration and field testing activities which were part of the project, "Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education." While this was a small-scale feasibility test, we believe vocational and technical teacher educators and researchers will find the results both interesting and beneficial.

We wish to acknowledge the following Center project personnel: Dr. Calvin J. Cotrell, Principal Investigator; Dr. Charles R. Doty, Associate Investigator; James L. Hoerner, Edward R. Hauck, and Niyazi Karasar, Graduate Research Associates.

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Robert E. Taylor
Director
The Center for Vocational
and Technical Education

FOREWORD

The activity being reported was the second of three feasibility tests completed during the period November, 1967 to June, 1968. These studies were essential to the planning and implementation of seven demonstration and field tests conducted jointly with several cooperating teacher education institutions in the project "Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education." The investigators believe that persons interested in developing and testing feedback techniques for teacher education will find these experiences and materials beneficial.

Special recognition is due the members of the panel of judges who evaluated the videotaped teaching sessions: Miss Joanne Wohlgenant, home economics teacher educator, Washington State University, and Mr. Warren Weiler, former state supervisor of vocational agricultural education, State of Ohio. Great appreciation is extended to those persons who volunteered their time as teachers:

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Calvin J. Cotrell
Charles R. Doty

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SUMMARY

Presented in this report are the results of the feasibility testing of selected micro-teaching and video recording feedback techniques in a laboratory setting designed to simulate vocational teacher education. Volunteer teachers were selected and randomly assigned to four treatment groups in a repeated measurement design to compare the relative effectiveness of four different feedback techniques: 1) face-to-face conference without video feedback, 2) face-to-face conference with video feedback, 3) face-to-face conference with a four-day delay in video feedback, and 4) remote supervision with a seven-day delay in video feedback and audio track suggestions by a teacher educator.

Sixteen teachers, with four in each of the four feedback groups, practiced oral questioning techniques during five five-minute teaching sessions over a period of five weeks. Their video-recorded lessons were evaluated by a panel of two judges. The mean performance scores on the skill of oral questioning for each of the four groups, derived from the panel ratings, were subjected to an analysis of variance test which resulted in no significant differences at the .05 level in performance among the groups over the series of teaching sessions. The one exception to this finding was the performance of the feedback groups on session two, which was significantly different at the .05 level. According to the change in teaching performance from pretest to posttest, however, each group made significant progress when considered separately.

The participating teachers' suggestions for improving the teacher education techniques and the investigators' informal observations were also reported. It was concluded that all feedback techniques were feasible, and certain modifications of the remote and delay-in-feedback techniques should be considered for field testing in ongoing teacher education programs.

ASSESSMENT OF MICRO-TEACHING AND VIDEO RECORDING IN
VOCATIONAL AND TECHNICAL TEACHER EDUCATION: PHASE II--

AN ANALYSIS OF FACE-TO-FACE, REMOTE AND
DELAY-IN-FEEDBACK TECHNIQUES

CHAPTER I

BACKGROUND FOR THE STUDY

Vocational and technical education has been suffering from a shortage of teachers and teacher educators. Preservice programs have not been producing an adequate supply of teachers, according to Venn (1968), and inservice education has been neglected because the number of teachers in the field has been increasing more rapidly than the services for them (Barlow, 1966). Never has the pressure been greater for efficiency in teacher education nor the search for potential solutions to these problems more intense. There exists a need for a series of investigations into applications of micro-teaching and video recording as potential methods for improving the efficiency of vocational and technical teacher education.

THE FOUNDATION FOR A SERIES OF STUDIES

Vocational and technical teacher education programs with the resources to provide the laboratory for assessing the values of micro-teaching and video recording were not available in 1967, during the planning stages of this project. Therefore, the first three studies in the project were conducted in simulated teacher education programs at The Center for Vocational and Technical Education. Subsequently, the materials and techniques were screened, refined, and adapted for seven field tests and demonstrations.

It was the investigators' desire to develop and assess the feasibility of preservice and inservice teacher education techniques which would save teacher educators the loss of time traveling to schools and would increase the efficacy of typical vocational teacher education methods classes.

Because its inherent economy allows short teaching sessions and small numbers of students and permits a micro-skill of teaching to be practiced and developed rapidly, the micro-teaching format was regarded as ideal for testing the effects of various teacher education techniques (Allen and Ryan, 1969). Hence, simulating practice teaching, an internship, or itinerant teacher education conditions was facilitated. Developing the essential instruments, designing, and testing promising teacher education feedback techniques were some of the challenges for this study,

which was the second in the series of three efforts required to prepare for field testing.

RELATED STUDIES

In designing this study, several investigations in general elementary and secondary education were carefully perused for applications and techniques which seemed appropriate for vocational and technical education. The most extensive of these were directed by Bush and Allen at Stanford University (1964). For simulation, the investigations by Kersh (1963) and Vlcek (1965) were found most helpful. For the micro-teaching format and process, the reports of Olivero (1964) and Acheson (1964) were invaluable. The work of Allen and Young (1966) provided assistance in the use of second sound track techniques. In the development of measuring instruments, the work of Fortune (1965), Allen (1966), and Bush, *et al.* (1966) was studied.

PURPOSE AND OBJECTIVES

The central purpose of the study was to design and pretest the feasibility of selected teacher education feedback techniques, supporting evaluation instruments, and instructional materials under simulated vocational teacher education conditions. More specifically, the objectives of the study were designed to find answers to the following two questions:

1. What are the comparative merits of the selected teacher education feedback techniques in terms of improving teaching skill performance: a) face-to-face conference, b) face-to-face conference with video feedback, c) face-to-face conference with a four-day delay in feedback, d) remote supervision via a second sound track on the videotape with a seven-day delay?
2. What are the teachers' reactions to the simulated teacher education program and the feedback techniques experienced?

CHAPTER II

PROCEDURES

To accomplish the objectives of the study, a simulated teacher education program was designed to provide the opportunity to test the four selected teacher education feedback techniques.

THE TEACHER EDUCATION PROGRAM

A micro-teaching format was used in the program because five-minute teaching sessions with four students are considered sufficient for simulating teacher education programs with a variety of feedback techniques, as well as providing the teachers an opportunity to teach five lessons from which measurements on their performances can be obtained (Allen and Ryan, 1969). Video recording of all teaching sessions provided the means for collecting performance data on the teachers as they progressed through the program.

The four teacher education techniques selected to be tested in the program were variations in the nature of feedback given teachers. These techniques were: 1) face-to-face conference based on the personal observation of the teaching session by the teacher educator to develop suggestions for improving the teacher's skill, 2) face-to-face conference including playback of the video-recorded teaching session, 3) face-to-face conference with a four-day delay in feedback, and 4) remote supervision via a second sound track on the videotape with a seven-day delay.

RATIONALE FOR SELECTING FEEDBACK TECHNIQUES

The face-to-face conference was selected because this technique simulates as closely as possible conventional field conditions, such as a teacher-teacher educator conference as part of a methods class, student teaching, or an inservice program. By comparing the other three techniques to the face-to-face technique, it was possible to determine the relative merits of the three experimental techniques.

The face-to-face plus video feedback technique provided an opportunity to determine the value of video feedback as a supplement to the conventional face-to-face conference with a teacher.

The delay-in-feedback technique was selected to simulate a particular set of field conditions. Assuming that a teacher educator has 30 or more teachers to supervise (either preservice teachers in student teaching or inservice teachers) within a hundred-mile radius, it would be impossible for him to serve these teachers effectively by visiting them regularly, at least once a month, for observation and conference. It would be possible, however, for the teachers to make video recordings of their teaching in their schools and send or take the recordings to the teacher educator, going at a later date to his office to have a conference with him. The existence of such problems in large school districts or in regions served by teacher education institutions inspired the investigators to develop and pretest the delay-in-feedback technique.

The delay-in-feedback technique also introduces the opportunity to check the value of video feedback in the "total reconstruction" of a teaching situation. Comparing the performance of teachers experiencing the conventional face-to-face technique with those experiencing the delay-in-feedback technique tests the feasibility of having teachers make video recordings of a teaching session and then using the video playback several days later for a conference. Thus, testing the delay-in-feedback technique determined the feasibility of applying video recording in a situation where the teacher could travel to a teacher educator for assistance. Feedback could be based upon observing teaching which would otherwise require travel time for the teacher educator. If such a technique were feasible, it would be possible for the teacher educator to have more time to devote to conferences with teachers instead of spending time traveling to schools.

A remote feedback technique was needed for situations where it is impossible for the teacher educator, because of distance, weather, or terrain, to make supervisory visits to inservice or student teachers as frequently as desired. This technique simulates a situation in which a teacher makes a video recording of his own teaching in the school and sends the videotape to the teacher educator. The teacher educator then views the video recording of the teacher's session and places his suggestions and comments on the second sound track of the videotape. The teacher educator then sends the videotape back to the teacher. The teacher obtains assistance by viewing the video recording of his teaching session and listening to the teacher educator's comments on the second sound track.

Since there is more than one factor differing between some of the techniques, in the final analysis one can only say that given this technique with these factors, technique A as compared to technique B caused these effects. No single factor can be pinpointed as having caused any differing effects, only a combination of factors. Because the investigators wanted to simulate

field conditions, there were multiple factors in some treatments. This problem of analysis was recognized but judged acceptable for the laboratory feasibility testing of these techniques. Since many variables could bias the effect of the teacher education techniques on teacher behavior, each technique was planned carefully.

DESCRIPTION OF PROCEDURES FOR TREATMENT GROUPS

The procedures of the feedback techniques which were used in the treatment groups are explained in the following:

1. Face-to-face conference. The teacher received feedback from the teacher educator immediately after teaching (no videotape feedback). In this treatment the teacher educator personally viewed the lesson (five-minute sessions). Each session was video recorded. Immediately following the teaching session the teacher, the students, and the teacher educator used the critique form for the skill of oral questioning (See Appendix A) to evaluate the teacher's performance of this skill. The teacher educator collected the critique forms from the teacher and students and quickly reviewed the forms. The students then left the classroom, and the teacher and teacher educator had a 15-minute critique session. Following the critique session, the teacher spent 15 minutes re-planning the same lesson. After the replanning, the teacher taught the same lesson to a different group of students and had another critique session. This cycle required one hour and 15 minutes.

The face-to-face conference included micro-teaching and should not be considered a conventional teaching situation except for the type of feedback. It approximated as closely as possible conventional feedback only.

2. Face-to-face conference with video feedback. The teacher received video playback and teacher educator feedback immediately after teaching. In this treatment the teacher educator personally viewed the lesson (five-minute sessions). Each teaching session was video recorded. Immediately following the teaching session, the teacher, the students, and the teacher educator used the critique form on the oral questioning skill to evaluate the teacher's performance of this specific skill. The teacher educator collected the critique forms from the teacher and students and quickly reviewed the forms. The students then left the classroom, and the teacher and teacher educator viewed the videotaped recording of the teaching session. No comments were made by the teacher educator or the teacher during the first viewing. Following the viewing of the teaching session, the teacher and teacher educator analyzed the teaching session focusing on the teacher's skill of oral questioning. If some point of disagreement occurred in the

discussion or there was need for review because of lack of recall, the tape was reversed to the item in question and replayed. Following the critique session, the teacher spent 15 minutes replanning the same lesson. After replanning, the teacher taught the same lesson to a different group of students and had a critique session as described above. This cycle lasted one hour and 15 minutes.

3. Delay in feedback. This technique used the principles of micro-teaching, five-minute lessons and four students, as did the other techniques, but had a time delay between the feedback and the reteaching session. The teacher educator did not personally view the teacher teaching in the classroom. In this technique the teacher taught, evaluated his teaching with the students, and then left the laboratory. During the period of delay before feedback, the videotaped teaching session and critique forms were delivered to the teacher educator for his examination. On the fourth day after the teaching session, the teacher came to the laboratory and had a conference with the teacher educator. At this time the video-recorded teaching session was viewed by the teacher and teacher educator without either person making comments. Then there was discussion of the teaching session on the oral questioning skill. In the discussion, if some point of disagreement or lack of memory occurred, the tape was reversed to the section in question and replayed. After the conference, a four-day delay occurred before the teacher taught again. During this time the teacher replanned for the reteaching session.

4. Remote supervision. This feedback technique incorporated micro-teaching with a seven-day delay between the teaching session and feedback conference. In this treatment, the teacher educator did not personally view the teacher teaching in the classroom. The teacher taught, evaluated his teaching session with his students and left the laboratory. During the seven-day delay, the video-recorded teaching session and the teacher and student critique forms were reviewed by the teacher educator. The teacher educator prepared written notes for his comments and then recorded his suggestions to the teacher on the second sound track of the videotape. On the seventh day after teaching the lesson, the teacher returned to the laboratory and viewed the video recording of his teaching session alone and listened to the teacher educator's comments on the second sound track. The teacher planned for 15 minutes to reteach the lesson and then taught it to a different group of students. The teacher and his students then completed their private evaluations and left the laboratory.

OBJECTIVES SELECTED FOR THE TEACHER EDUCATION PROGRAM

Helping teachers develop the skill of oral questioning was selected as the educational objective for the study. This

selection was accomplished through a survey of the vocational teacher education department heads on The Ohio State University campus and the vocational research and development specialists at The Center.

To facilitate the teaching of the skill of oral questioning, an instrument was developed which concentrated on that skill (See Appendix A). The instrument served as a guide for instruction and evaluation of the teacher by the teacher educator and as a self-evaluation device for the teacher. In addition, the students used this instrument to analyze the teacher's performance. The instrument was also used by the teacher educator to determine how the teacher and the students rated the teaching as well as a research tool for a panel of judges to measure the teachers' performance by viewing the videotaped teaching sessions.

The teacher participants in the pilot study (Phase I) preceding this study had asked that they be given more information on the teaching skill which they were practicing. To help the teachers more fully understand the teaching skill of questioning, additional materials were provided. It should be noted here that although the teachers concentrated their efforts on improving their oral questioning skills, each teaching session was a complete lesson. In keeping with the concept of micro-teaching, each lesson included an introduction, presentation, application, and evaluation.

PARTICIPANTS

Teacher educator. Two teacher educators provided the supervision of the teachers in each of the four feedback techniques. They were graduate research associates at The Center, and each had a minimum of seven years' teaching and two years' supervisory experience.

Teachers. As subjects for the study, 16 teachers representing the vocational service areas of agricultural, business and office, home economics, and trade and industrial education were selected from a population of volunteers in The Ohio State University area. In all service areas except trade and industrial education, the volunteers were recruited from undergraduate classes in teaching methods (a course required prior to student teaching). The trade and industrial teachers were recruited from the ranks of teachers with less than three years of public school teaching experience who had entered teaching directly from industry and had no college preparation except in professional education.

Students. To provide real students for the teaching sessions 24 high school students at the eleventh- and twelfth-grade levels, contacted through high school guidance counselors, were employed

for the study. The criteria for their selection specified that they be at either grade level and have a record of good conduct and citizenship. Before they were employed, they were required to sign a legal waiver allowing The Center to use the video recordings for instructional purposes.

Panel of judges. An independent two-member panel of judges was utilized to rate the teachers' performances by viewing the video recordings of all teaching sessions and completing the critique forms. A teacher educator and a state supervisor in vocational education served as the judges in this study.

SCHEDULE

The schedule for data collection began with the first teaching session, which served as a pretest. This experience provided an opportunity for the teachers to become acquainted with the administrative procedures and physical surroundings. After this first session, the teachers were given a presentation on the oral questioning technique. The teachers then participated in the micro-teaching process, presenting four lessons and receiving feedback in accordance with their assigned treatment groups. For each micro-teaching cycle, each teacher prepared a new lesson and taught a different group of students.

After all teaching for the study was completed, a follow-up questionnaire was used to determine teacher reactions toward the experience received (See Appendix B).

RESEARCH DESIGN

Experimental design. A repeated measurement design was used which required a stratified random assignment of the teachers to four treatment groups (See Figure 1).

Group 1	SR	O ₁	O ₂	X ₁	O ₃	X ₁	O ₄	X ₁	O ₅
Group 2	SR	O ₁	O ₂	X ₂	O ₃	X ₂	O ₄	X ₂	O ₅
Group 3	SR	O ₁	O ₂	X ₃	O ₃	X ₃	O ₄	X ₃	O ₅
Group 4	SR	O ₁	O ₂	X ₄	O ₃	X ₄	O ₄	X ₄	O ₅

SR = Stratified randomization of teachers to groups

O₁ = Observation and evaluation of teaching session one (pretest), etc.

X₁ = Treatment one, etc.

Figure 1. Experimental Design

Statistical design. An analysis of variance design was selected for analyzing the data. This was a three-factor (treatment groups, teaching sessions, and raters) experiment with repeated measures on the last two factors, teaching sessions and raters (Winer, 1962). For this analysis, a Biomedical BMD02V computer program was used with a special application to the repeated measurements design (Dixon, 1967).

CONTROLS

Certain administrative procedures and research controls were established to reduce bias and make the teaching situation as normal as possible. The first control administered was the assignment of an equal balance of persons from the different vocational service areas to the techniques (stratified random sampling). There were four teachers representing each of four services assigned randomly to the four treatments; thus, each technique had one teacher from each service.

Another control was the equal random assignment of teachers from the different treatment groups to each of the two teacher educators. Each teacher educator supervised the same two teachers in each group throughout the experiment. This balanced the teacher educators' influence in each treatment. A televised presentation concerning the skill of oral questioning was used to provide the same information to the teachers who had to meet at two different times because of scheduling difficulties. To help obtain spontaneous student responses, the teacher taught a different group of students each time. The orientation of teachers was carefully planned to avoid difficulties experienced in the previous study relative to communicating the objectives of the project and the teachers' contributions to the project. Since time is an extremely important factor in research, all time for teaching, supervisory conferences, or remote feedback was carefully planned and schedules were followed.

To prevent the teachers from becoming confused as to exactly what they were to do each time they taught, a detailed procedure was provided for each of them. Exact procedures were outlined for the technicians to prevent interference with the teachers' activities, including the prescribed feedback.

To reduce confusion in data collection and to assist in giving each teacher an opportunity to receive equivalent feedback whether he was assigned face-to-face or remote supervision, the teacher educators were given the following instructions: 1) procedures for the teacher educator which contained the observation techniques and paper handling details, and 2) supervisory guidelines which dealt with principles of supervision. To facilitate the monitoring of teacher progress and consistent supervision, the teacher

educators also kept detailed conference notes on their suggestions to the teachers.

To reduce possible bias, the panel of judges rated the teaching sessions in a random order. This procedure prevented the panel from knowing whether they were viewing the first or last teaching sessions of each teacher.

Other minor procedures included name cards for the teachers and students to prevent difficulties in communication and a large clock with five minutes marked off to help teachers keep within time limitations.

These controls and procedures were carefully outlined and explained to all participants involved in the study, from technician to teacher educator, to aid in setting up an educational program which would provide the vehicle to gather the best possible research data.

TRAINING FOR USING THE INSTRUMENT

Four types of raters used the instrument--the teachers, the teacher educators, the high school students, and the panel of judges. The teachers, teacher educators, and high school students were given the instrument and allowed to see a video-recorded presentation of the oral questioning teaching skill. After the presentation, the teachers were given written descriptions of the teaching skill prepared by the Ohio State Trade and Industrial Education Services Office (1966). All teachers read this material before returning to the laboratory to begin teaching.

The panel was trained in a similar manner. However, the judges evaluated several video-recorded micro-teaching sessions which had been randomly selected from the recordings made during the pilot study (Phase I). After evaluating each session, the panel compared their evaluations to the project staff's evaluations (which had been prepared prior to the panel training session). Once agreement was reached between the panel and investigator evaluations, the panel began to evaluate the teaching sessions for this study.

EQUIPPING THE LABORATORY

Video hardware. Two video recording systems were used in this study, one serving as a back-up system in case of equipment difficulties. Each system consisted of an Ampex Video 7500 Recorder, Ampex CC-324 camera, Cannon C-16 zoom lens, Sampson 7301 tripod, Zenith solid state TV monitor (regular TV set with a 75-300 ohm TV set match model TM to the VHF outlet for the video

input from the video recorder) and a Norelco D109 lavalier cord-type microphone with an Atlas M12 stand. For lighting, two 10" Color-Tran mini-lights with B5-32F 1000 watt quartz lights were used. To achieve a useable second sound track, both Ampex 7500 recorder "audio one" sound tracks (the editing track) were altered by installing an amplifier to boost the capability of that track. With this modification, both sound tracks on the recorders gave good recording and playback capabilities and then met the specifications set for video equipment to be rented for the project.

In addition to the complete back-up system to ensure collection of data, the equipment rental agreement provided for maintenance service or temporary replacement of a system within 24 hours if equipment could not be repaired on site.

Laboratory furniture. The minimum essentials for setting up the micro-teaching laboratory were: 1) chalk board, 2) music stand for notes, 3) table for teacher equipment and supplies, 4) four student chairs (tablet armchair type), 5) overhead projector, and 6) flip chart.

CHAPTER III

RESULTS

The evidence required to meet the objectives for this study was based upon the statistical analyses of data on teacher performance, analysis of teachers' opinions, and informal observations of the investigators.

PERFORMANCE DATA

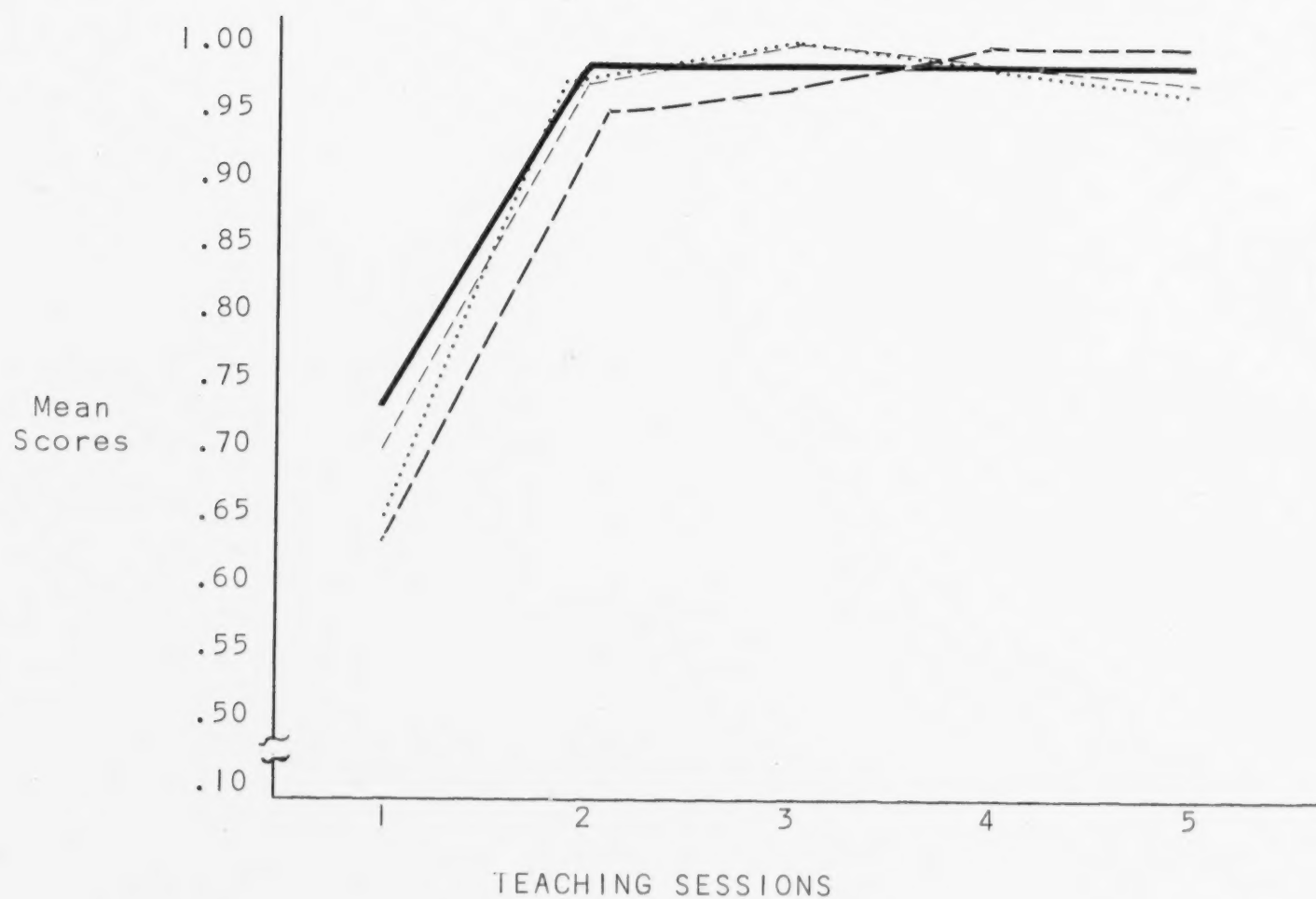
STATISTICAL ANALYSIS

The data analyzed were collected from the measurement of teacher performance with the evaluation instrument on oral questioning (Appendix A). A unique feature of this instrument is that it includes two scales. The quantitative scale (accomplished) measures whether or not the teacher accomplished the behavior and the qualitative scale (degree of accomplishment) measures the quality of the performance. For the purpose of analysis the following numerical scores were given:

Accomplished Scale	Did Not Accomplish	0
	Accomplished	1

Degree of Accomplishment Scale	Did Not Accomplish	0
	Very Poor	1
	Poor	2
	Average	3
	Good	4
	Excellent	5

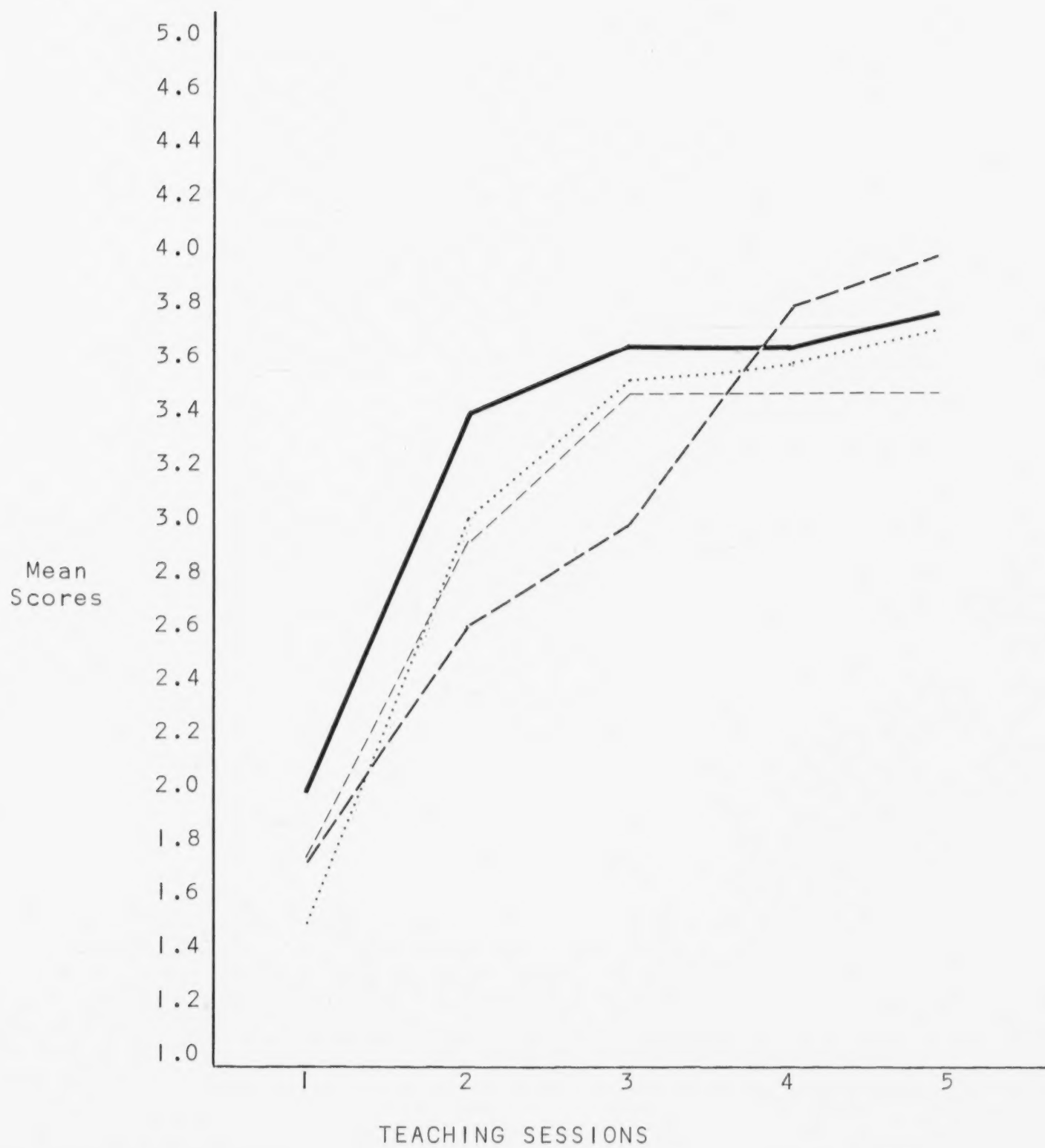
Since all data were reduced to means, the performance curves were plotted with from 0 to 1 for the accomplished scale score (See Figure 2) and from 0 to 5 for the degree of accomplishment scale score (See Figure 3).



Treatment Groups:

- Face-to-face conferences (1)
- Face-to-face conference with video feedback (2)
- Delay in feedback (3)
- Remote feedback (4)

Figure 2. Performance Curves, Accomplished Scale Mean Scores



Treatment Groups:

- Face-to-face conferences (1)
- Face-to-face conference with video feedback (2)
- Delay in feedback (3)
- Remote feedback (4)

Figure 3. Performance Curves, Degree of Accomplishment Scale Mean Scores

The conditions were met for the use of the analysis of variance test of significance because there were no significant differences among the mean performance scores for the treatment groups on the first teaching session (pretest) on either scale (See Appendix C, Source A) as evaluated by the teacher educators, teachers, students, and panel of judges. Consequently, analysis of variance was used to test for significant differences among the teachers' performance on teaching sessions 2, 3, 4 and 5, using the panel of judges' mean ratings (See Appendix D). The panel of judges' ratings were used for the final analysis for two reasons: 1) the highest rater reliability (Winer, 1962) between raters was obtained between the two judges (.76), and 2) the investigators wanted an independent measure of performance.

COMPARATIVE MERITS OF THE TEACHER EDUCATION FEEDBACK TECHNIQUES

Question one for the study asked for a determination of the comparative merits of the four feedback techniques in terms of improving teaching skill performance. Placing this question in context for statistical testing produced the following null hypotheses:

1. There are no significant differences among the mean performance scores over the series of four teaching sessions for the four teacher education feedback groups.
2. There are no significant differences among the mean performance scores for teaching sessions 2 to 5 for all teachers in the combined feedback groups.
3. There are no significant interactions among the mean performance scores for the four teacher education feedback groups and the four teaching sessions (i.e., a certain combination of teaching session and teacher education feedback group will not result in a significant difference in performance).

Null hypothesis number one. Testing the first null hypothesis provided an answer to the question: Did one feedback group perform better than another over the series of four teaching sessions? There were no significant differences found among the four teacher education feedback groups with respect to accomplished scale or degree of accomplishment scale mean scores over the four teaching sessions (See Tables 1 and 2, Source A), indicating no one teacher education feedback group performed significantly better over the series of four teaching sessions. The null hypothesis was not rejected.

TABLE I

Analysis of Variance, Panel of Judges' Ratings
Accomplished Scale Mean Scores

Source	S.S.	d.f.	F	Value of $F_{\alpha .05}$
A	.00063	3	.187	3.49
Error	.01349	12		
B	.00165	3	1.410	2.88
AB	.00777	9	2.205*	2.18
Error	.01410	36		

A = Treatment Groups (1, 2, 3 and 4)

B = Teaching Sessions (2, 3, 4 and 5)

AxB = Treatment Groups x Teaching Sessions Interaction

*Significant at .05 level

TABLE 2

Analysis of Variance, Panel of Judges' Ratings
Degree of Accomplishment Scale Mean Scores

Source	S.S.	d.f.	F	Value of $F_{\alpha, .05}$
A	.9101	3	.784	3.49
Error	4.6435	12		
B	5.6922	3	15.811*	2.88
AB	1.9522	9	1.807	2.18
Error	4.3298	36		

A = Treatment Groups (1, 2, 3 and 4)

B = Teaching Sessions (2, 3, 4 and 5)

AxB = Treatment Groups x Teaching Sessions Interaction

*Significant at .05 level

Performance curves were plotted for the mean scores for both scales. In terms of accomplished scale mean scores (i.e., the extent to which the teachers actually engaged in each of the behaviors required in the skill of oral questioning), the four groups of teachers increased their mean scores greatly on teaching session two (See Figure 2). The groups receiving the face-to-face conference and face-to-face conference with video feedback tended to maintain a consistently high accomplished scale mean score. While the delay-in-feedback group did not achieve a mean score quite as high as the others on teaching session two, it continued to progress and achieved the highest possible mean score by teaching session four and maintained it in session five. The remote feedback group increased its mean performance score, reached a peak on teaching session three, and then decreased its mean score slightly on sessions four and five.

On the degree of accomplishment scale mean scores (i.e., the quality of the teachers' performance on the behaviors of the oral questioning skill), the four groups of teachers each increased their scores greatly on teaching session two (See Figure 3). For that teaching session, the face-to-face conference group had the highest mean score and the delay-in-feedback group had the lowest mean score. The remote feedback and the face-to-face conference with video feedback groups scored at levels in between the other two groups. From teaching session two, the delay in feedback group increased its mean score on each of the remaining sessions and achieved the highest mean score of the four groups. The conventional face-to-face conference group increased its mean score on each of the teaching sessions from three to five and achieved the second highest mean score.

Examination of the performance curves indicated that teaching sessions two and three might have produced significant differences among the teacher education feedback groups' mean scores. A simple effects analysis was calculated and it was learned that significant differences occurred in the scores on teaching session two (See Table 3).

The next question raised concerned which feedback groups were responsible for the differences in mean performance scores in teaching session two. To find answers to this question, the performance curves for the degree of accomplishment scale mean scores were examined again (Figure 3). According to the performance curves, it was obvious that the greatest differences were attributed to the delay-in-feedback group (lowest mean score) and the face-to-face conference group, which had the highest mean score. Consequently, only in the case of performance as measured by degree of accomplishment scale mean scores were there teaching sessions in which one teacher education feedback group outperformed another.

TABLE 3
Simple Effects Analysis
Performance Differences of Four Treatment Groups
Degree of Accomplishment Scale Mean Scores

Teaching Session	Source	S.S.	d.f.	F
2	A	1.376	3	2.671*
	Error	2.061	12	
3	A	.870	3	1.510
	Error	2.309	12	

A = Treatment Groups 1, 2, 3, and 4
*Significant at .05 level if ≥ 2.61 .

Null hypothesis number two. The question of whether the mean performance scores of the teachers in the combined feedback groups differed significantly among teaching sessions two to five was answered by testing the second null hypothesis. There were significant differences found on the degree of accomplishment scale mean scores (See Table 2, Source B). A comparison of the grand mean scores on each of the teaching sessions revealed that the greatest difference occurred between teaching session two (3.00) and teaching session five (3.79). The null hypothesis was rejected.

Null hypothesis number three. The question of whether a significant reversal in performance among teacher education feedback groups was produced by a certain combination of teaching sessions and treatment groups was answered by testing the third null hypothesis.

There were statistically significant interactions found at the .05 level between teacher education feedback groups and teaching sessions for the accomplished scale mean scores only (See Table 1, Source AB). However, the interactions were significant at approximately the .10 level on the degree of accomplishment scale mean scores (See Table 2, Source AB). That is, a particular feedback group performed better than the others on a given teaching session.

From the performance curves (Figures 2 and 3) it is obvious that the delay-in-feedback group performed differently than the others between teaching sessions three and four. That is, its mean score increased on session four while the others tended to decrease. Since there were significant interactions, the third null hypothesis was rejected.

SUMMARY OF FINDINGS ON TEACHERS' PERFORMANCE

There were significant differences found in the mean performance scores of the different feedback groups in the testing of the null hypotheses. While there were no differences in the mean performance scores of the various feedback groups across all four of the teaching sessions, a significant difference was found in the mean performance scores of the feedback groups on teaching session two. Significant differences existed among the mean performance scores of the teachers in the combined feedback groups among teaching sessions two to five, with the greatest difference occurring between sessions two and five. Also, a significant interaction was found between feedback groups and teaching sessions which was attributed to the superior performance of the delay-in-feedback group on teaching session four when the other groups were decreasing their performance, as compared to their mean scores for teaching session three.

Finding that the face-to-face conference with video feedback was no better than the conventional face-to-face conference without video was not very encouraging, but the limits of the laboratory feasibility study were considered. The investigators were encouraged by the performance of teachers experiencing the remote and delay-in-feedback techniques. Since there was no difference in the performance of the teachers, it was possible that the expected losses due to delay in feedback and remote feedback (recorded suggestions as opposed to a personal, face-to-face conference) did not occur.

OPINIONNAIRE DATA

Teachers' reactions concerning the teacher education feedback techniques and the simulated teacher education program were measured using the instrument shown in Appendix B. The percentages of the scores classified from "high to low" (1-4) were calculated for each item of the instrument (See Table 4).

Item One, concerning orientation to the project after the persons had volunteered to teach, was rated "very well" (1) by 15.4 percent and "fairly well" (2) by 84.6 percent of the responding participants. Thus, there were no low ratings for this item. Suggestions for future orientations included shortening the

TABLE 4
Teachers' Rating of Items
in the Opinionnaire*

Items	Ratings			
	High 1	2	3	Low 4
1	15.4	84.6		
2				
3	84.6	15.4		
4	23.1	30.7	23.1	15.3
5	61.5	30.7	7.7	
6	100.0			
7	100.0			

*Thirteen respondents out of 16 participants.

orientation session and emphasizing that the video recordings would not be made available to outside sources without the participant's permission. (This second suggestion was prompted by reaction to a statement made by the staff in regard to the possibility of showing the tapes to prospective employers if the participant so desired. Some participants misunderstood this statement, believing that a potential employer could view the tapes without the participant's permission.)

Item Two in the instrument was not scored since the teachers did not view their first teaching session.

Item Three, concerning the value of teaching students of the level they were preparing to or were teaching instead of teaching peers, was rated "of great value" (1) by 84.6 percent and "of some value" (2) by 15.4 percent of the participants who responded. No low ratings were indicated for this item. Some of the comments about the question were as follows: "It (teaching high school students) presents the real-life experience whereas with peers one is somewhat self-conscious of teaching in front of them," "Helps the future teacher know what type of responses and questions

he can expect," and "The closer one is to the actual level of students one will teach, the better prepared teacher he will be."

Question Four, relative to the benefits of the get-acquainted period (a few minutes of "warm-up" before each teaching session) provided for the teachers and students, received a variety of replies. The question was rated "of great value" (1) by 23.1 percent, "of some value" (2) by 30.7 percent and of "minimal or no value" (3 and 4) by 38.4 percent of the responding participants. One revealing comment was "Prepare a sheet of hints that teachers may follow in 'getting acquainted'" (The staff had assumed that the teachers would introduce themselves and talk to the students. This proved to be an incorrect assumption.)

The ratings on Item Five, concerning the adequacy of the skill presentation, were of special interest to the staff since the skill behaviors were pre-recorded and presented on television. This item was rated "very adequate" (1) by 61.5 percent and "fairly adequate" (2) by 30.7 percent of the participants responding. Comments on how the skill presentation might be improved included: "There is really no perfect way of illustrating it (the skill). I don't think it was sufficient"; "I feel a real good job was done on this but can't remember ways in which it (the skill presentation) could have been improved." One person asked that more models of the skill be shown after the teachers taught and another asked for more outside reading on the teaching skill.

Question Six, asking about the value of the supervisory sessions in helping replan the lessons, was rated "of great value" (1) by 100 percent of the responding participants. More contact with the teacher educators was requested by those in the remote supervision group, and other teachers asked for more instructional models.

Item Seven, relative to the value of this teaching experience to the total preparation for teaching, was rated "of great value" (1) by 100 percent of the responding participants. Comments concerning the item were: "Gives teacher an idea of what actual teaching is" and "It gave me confidence and assured me that I desire to be a teacher."

Item Eight was an open-ended question to obtain participant suggestions for future studies. Suggestions from responding participants included: stress the need for participants to be on time so schedule can be followed, provide longer teaching sessions, eliminate student evaluation of the teaching, and provide more teaching sessions.

In summary, the responding teachers held high regard for their experiences in the simulated teacher education program. However, they had mixed reactions to the get-acquainted period

with students. For improving future efforts, several suggestions were offered, such as emphasizing that video recordings will not be available to outside sources, preparing the teachers for getting acquainted with their students, providing more models of the teaching skills, arranging for contact with the teacher educator in remote supervision, and providing for more teaching sessions.

INVESTIGATORS' INFORMAL OBSERVATIONS

Informal observations by the investigators were made and have been summarized for those readers who may be interested. These observations cover such items as micro-teaching, video recording, teacher education feedback techniques, teacher educators, and teachers.

MICRO-TEACHING AND VIDEO RECORDING

The micro-sessions and micro-classes seemed to function in this study as anticipated. As in the pilot study, the preservice teachers had little difficulty in teaching a short time, whereas the inservice teachers felt the teaching sessions should be longer. The investigators had given each teacher a suggested list of topics for teaching five minutes. The teachers indicated that they referred to this list often to aid them in their selection of suitable topics.

The most important observation in this area was the need to control the video cameraman's tendency to overuse the zoom lens. Although the panel of judges who rated the videotaped teaching sessions did not complain, there was some concern by the investigators that "zooming in" on the teacher or students might destroy important observations of the total situation, thereby making it difficult to evaluate teacher and student behavior.

TEACHER EDUCATION FEEDBACK TECHNIQUES

The teacher education feedback techniques (treatments) simulated and tested in this study all seem to be feasible for preservice or inservice teachers, with few minor changes in procedures. The time schedules for teaching and supervisory conferences were adequate. The two face-to-face conference techniques, which were replicates of the pilot study, did not need to be altered. The delay-in-feedback technique worked smoothly and no teacher complaints were expressed to the investigators or teacher educators, even when the teachers had to come to the laboratory more times than those experiencing other types of feedback. The remote supervision feedback technique provided the investigators with the most useful information since it was so different from the other

techniques. This technique worked well; however, it was discovered that some minor changes needed to be incorporated before it was ready for field application. The teachers receiving remote supervision had a tendency to want to talk to the technician, which indicated a need to communicate their problems or thoughts to someone. Also, they stated to the investigators that they believed it would be helpful to meet with their teacher educator or supervisor at least once during the program.

TEACHER EDUCATORS

The teacher educators experienced no particular difficulties in recording their critiques on the second sound track on the videotape for the remote supervision technique. They, however, needed privacy in their work to perceive the teaching behaviors. Completion of their first critiques (analyzing the micro-lesson and recording their comments on the second sound track) required an hour and a half. The teacher educators reduced this time to one hour during the study. They found that this method required them to be specific--no generalizations would convey the proper meaning to the teacher. For each criticism or praise of a teacher's teaching, a specific teaching behavior or the lack of it had to be pinpointed. Also, a definite suggestion or alternatives for changing behavior had to be stated.

To achieve their goals in the remote supervision technique, the teacher educators prepared critiques in a format that included: 1) an introduction to pre-cue the teacher concerning specific events in the teaching session, 2) an identification of representative behaviors during the teaching session, and 3) a summary at the end of the session to provide the teacher with one or two suggestions or plans of action for changing teaching behavior. It should be noted that these critiques did not include a visual picture of the teacher educator; only the voice of the teacher educator was heard by the teacher.

TEACHERS

Although the investigators did not ask for or encourage the participants to discuss their previous teacher education preparation, the preservice teachers expressed frustration at not having had the opportunity to teach (or teach more) during the time they were enrolled in professional methods courses.

Another observation was that some of the teachers complained that the girls or boys were not interested in their subject matter. An examination of their teaching showed that these teachers made such statements as, "I know you won't be interested in this," or "You girls won't understand this." They also ignored the students

they felt would not be interested. The teacher educators did not accept these complaints but instead informed teachers that it was their job to obtain the students' interest.

The preservice teachers expressed great satisfaction in being given the opportunity to teach. Their enthusiastic participation was carried into the methods courses in which they were currently enrolled and was reported by some of their professors.

The inservice teachers participating in this study stated that some of the problems that they had previously experienced in communicating with students and in presenting subject matter in their classrooms had also occurred while teaching under the simulated conditions. This observation by the inservice teachers gave the investigators the first evidence that the simulated programs using high school students were effective in creating a true-to-life situation.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Pretesting the feasibility and comparing the relative merits of four teacher education feedback techniques in a simulated teacher education program produced some helpful results. With two minor exceptions, there were no significant differences found in the performance of groups of teachers endeavoring to improve oral questioning skills and experiencing the following teacher education feedback techniques: 1) face-to-face conference, 2) face-to-face conference with video feedback, 3) face-to-face conference with video and delay in feedback, and 4) remote and delayed feedback with the supervisor's analysis on the second sound track of the video tape. An opinionnaire completed by the participants produced several helpful suggestions and indicated that the teachers found the experience to be very beneficial.

CONCLUSIONS

With full cognizance of the limitations of the feasibility study, i.e., the size of the sample, number of teaching sessions, etc., the investigators offer the following conclusions:

1. Teachers may improve their performance on pedagogical skills as well under remote and delay-in-feedback techniques as they do under conventional face-to-face conference techniques.
2. The micro-teaching process may be more beneficial than the particular feedback technique used with it.
3. The micro-teaching process was appropriate for testing the feasibility of the feedback techniques in a simulated vocational teacher education program.
4. The delay-in-feedback and remote feedback techniques were found feasible for field testing in actual teacher education program operation.
5. The teachers experiencing the remote and delay-in-feedback techniques performed as well as those receiving immediate feedback; hence, video feedback may provide total reconstruction of a teaching session.

RECOMMENDATIONS

As suggestions to guide the future work in this series of studies, the following recommendations were made by the investigators:

1. For the remote supervision feedback technique, a modification was recommended to provide for the teacher and teacher educator to have an orientation conference prior to beginning remote supervision.
2. Consideration of using only one sound track of the videotape in the remote supervision technique was recommended since it was learned that most portable video recorders do not have two sound tracks.
3. Arrangement for field testing was recommended for both the delay-in-feedback and remote feedback techniques in actual teacher education programs, with the previously recommended modifications of the remote techniques being incorporated.

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GLOSSARY OF TERMS

Instructional model. A video recording of a complete or partial teaching session which illustrates a teaching skill, e.g., oral questioning techniques.

Micro-teaching. A scaled down teaching session, five to 10 minutes of teaching to four or five students, in which the teacher has the opportunity to practice specific skills of teaching. The candidate has the opportunity to teach, to have his lesson analyzed, and then to reteach the same lesson to a different group of pupils to try to change his teaching behavior. The sequence for a micro-teaching cycle includes: plan, teach, critique (feedback), replan, reteach, critique.

Pretest. The first teaching session in this study. It was used to allow the teacher to become acquainted with the physical facilities and procedures and to determine the teachers' capabilities prior to involvement in the study.

Remote supervision. A technique in this study whereby a teacher received supervision via a teacher educator's comments being recorded on a second sound track on the videotape. There was no personal contact between the teacher and the teacher educator. The teacher viewed his teaching session, rewound the videotape to a point on the videotape where the teacher educator had made his introductory comments and then was able to listen to the teacher educator's comments as well as see and hear the action of his teaching session.

Video feedback. The procedure used in the study which involved preparing videotape recordings of all participants' teaching sessions to provide opportunities for the teacher educator and teachers to view a replay of the teaching session.

APPENDICES

APPENDIX A

ORAL QUESTIONING CRITIQUE FORM

TO THE STUDENT:

A question is an act or instance of asking. Questioning by the teacher promotes directed mental activity on the part of the learner providing opportunity for the learner to be actively involved in the lesson. The question may be stated in words or may be simply an inquisitive facial expression or gesture. It requires some type of response on the part of the learner: stating a fact; recalling a selected thought; making a comparison of two things; making a judgment; analyzing an attitude or appreciation; or, directing thought.

The effective use of questioning by the teacher increases the student's freedom of action, affords more opportunities to express ideas, and makes the student less dependent on the teacher.

The following items will be used by you to evaluate your teacher's teaching. If the teacher did not accomplish the item, you will only mark "Did Not Accomplish." If the teacher did accomplish the item, you will mark "Accomplished" and then mark the column which describes how well the teacher "accomplished" the item.

Did the Teacher in the Lesson:

1. Use questions to draw information from me?
2. Ask a question, pause to give me time to think about the question, and then call on a student?
3. After calling on me, provide an opportunity for me to think about the question before requiring my response? (Before answering the question himself or calling on someone else.)
4. Present the questions in an order that made sense to me?
(For example: Were you able to follow the line of thought without getting lost?)

DID NOT ACCOMPLISH	ACCOMPLISHED	DEGREE OF ACCOMPL.				
		VERY POOR	POOR	AVERAGE	GOOD	EXCELLENT

5. Avoid repeating my answers?
6. Direct his questions so that I was able to participate about as often as everyone else?
7. React favorably toward my answers to questions?
(For example: Did the teacher give attention and consideration to your answers?)
8. Avoid questions requiring only "yes" and "no" answers?
(For example: Did the teacher ask questions which required you to apply ideas, principles, or facts to new situations?)
9. Ask questions which I could answer from my past experience?
10. Ask questions which were clear and short enough to remember?
11. Require me to go beyond my first answers?
(For example: Did the teacher encourage you to expand an idea, back-up ideas with facts and illustrations, bring other students into the discussion by getting them to respond to your answers?)

DID NOT ACCOMPLISH	ACCOMPLISHED	DEGREE OF ACCOMPL.				
		VERY POOR	POOR	AVERAGE	GOOD	EXCELLENT

Comments: (What can the teacher do to improve the use of questions in the lesson?)

Teacher _____ Date _____

Observer _____

APPENDIX B
TEACHERS' OPINIONNAIRE

Please comment on each item.

1. As a result of the first orientation to micro-teaching and videotape recording, did you understand what it was you were expected to do as a prospective participant?

☐ Very Well ☐ Fairly Well ☐ Uncertain ☐ Not at all

What are your suggestions for future orientation? _____

2. Do you think the teaching and viewing of your first lesson without previous explanation from us on how to teach was a valuable experience?

☐ Of great value ☐ Of some value ☐ Of minimal value ☐ Of no value

What did you learn from the first lesson: _____

3. Do you feel that teaching students from the level you are planning to teach is of greater value than the teaching of peers in methods classes?

☐ Of great value ☐ Of some value ☐ Of minimal value ☐ No difference

Why? _____

4. Do you feel that the background information on the students and the get-acquainted period was of benefit for your teaching encounter?

☐ Of great value ☐ Of some value ☐ Of minimal value ☐ Of no value

What else could be done? _____

5. Do you feel that the skill presentation on _____
was adequate in explaining this teaching skill?

☐ Very ☐ Fairly ☐ Adequate ☐ Inadequate
adequate adequate

How could we improve? _____

6. Were the supervisory sessions of value in helping you replan
the lesson to better attain the teaching skill?

☐ Of great ☐ Of some ☐ Of minimal ☐ Of no
value value value value

How could the supervisor improve technique? _____

7. As a part of your total preparation for teaching, was this
teaching experience of value?

☐ Of great ☐ Of some ☐ Of minimal ☐ Of no
value value value value

In what way? _____

8. Please give any other suggestions that you have for our plan-
ning future teaching sessions.

APPENDIX C
ANALYSIS OF VARIANCE
TEACHING SESSION ONE (PRETEST)

Accomplished Scale Mean Scores

Source	S.S.	d.f.	F	Table Value F = .05
A	.034	3	.003	3.49
Error	4.591	12		
C	.905	2	23.816*	3.40
AC	.136	6	.605	2.51
Error		24		

*Significant at .05 level or above

A = Treatment Groups 1, 2, 3 and 4
C = Raters (Teacher Educators, Students and Panel)
AC = Interaction Between Treatments and Raters

(Continued on page 42)

Degree of Accomplishment Scale Mean Scores

Source	S.S.	d.f.	F	Table Value F = .05
A	.289	3	.020	3.49
Error	55.904	12		
C	34.615	2	55.474*	3.40
AC	2.391	6	1.276	2.51
Error	7.502	24		

*Significant at .05 level or above

A = Treatment Groups 1, 2, 3 and 4

C = Raters (Teacher Educators, Students and Panel)

AC = Interaction Between Treatments and Raters

APPENDIX D

PANEL RATINGS

Teaching Sessions

		1	2	3	4	5
T R E A T M E N T S	1	A	0.727	0.988	0.988	0.988
		DA	1.988	3.409	3.716	3.816
	2	A	0.647	0.988	0.988	0.966
		DA	1.545	3.090	3.579	3.756
	3	A	0.636	0.955	0.966	1.000
		DA	1.738	2.602	3.787	4.022
	4	A	0.704	0.977	1.000	0.977
		DA	1.693	2.897	3.488	3.579

A = accomplished scale mean score
DA = degree of accomplishment scale mean score